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ARMY INFORMATION DIGEST

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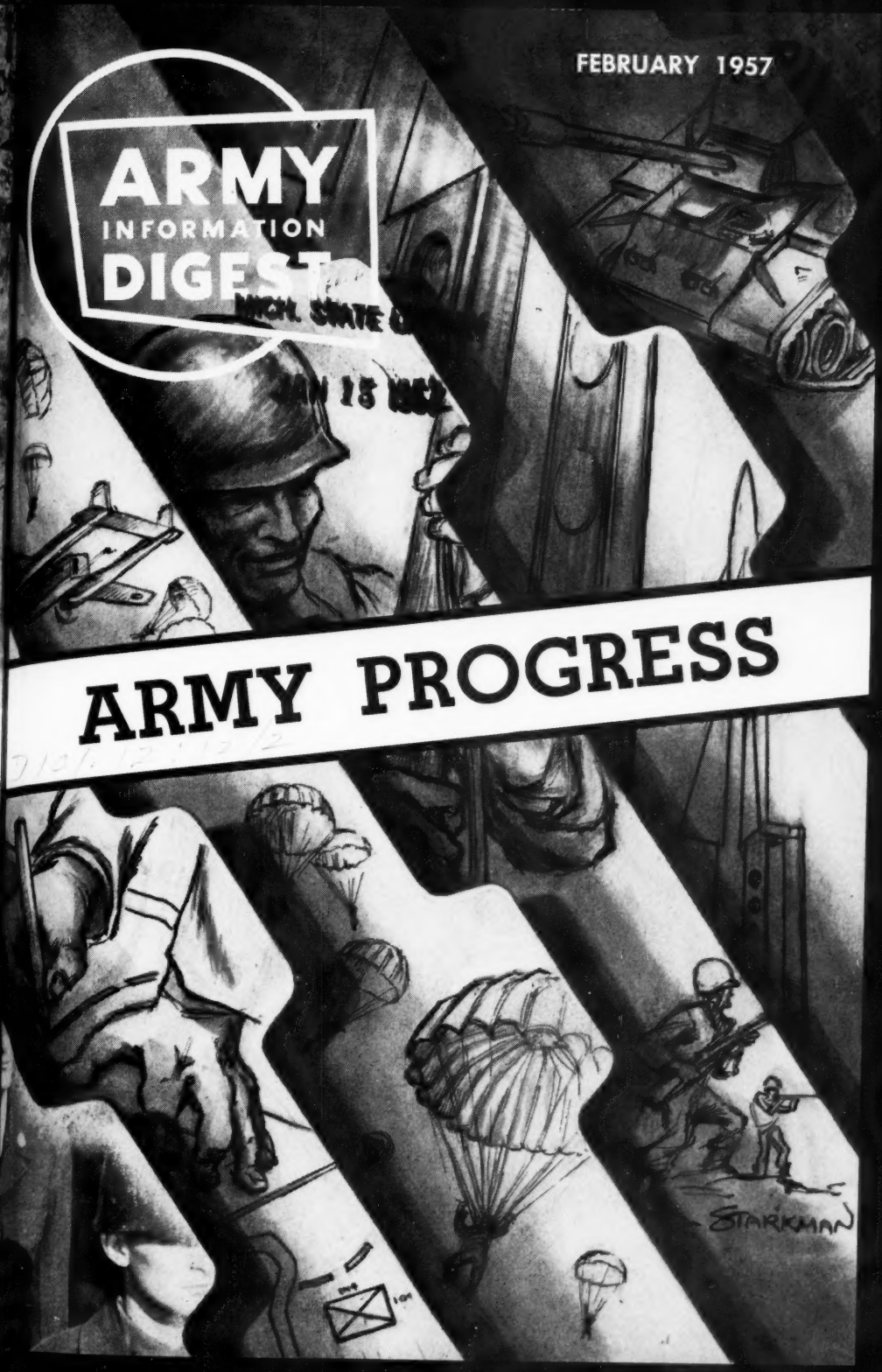

ARMY PROGRESS

THE OFFICIAL U. S. ARMY MAGAZINE

ARMY INFORMATION DIGEST

THE OFFICIAL MAGAZINE of the DEPARTMENT OF THE ARMY

The mission of ARMY INFORMATION DIGEST is to keep personnel of the Army aware of trends and developments of professional concern.

THE DIGEST is published under supervision of the Army Chief of Information to provide timely and authoritative information on policies, plans, operations, and technical developments of the Department of the Army to the active Army, National Guard, and Army Reserve. It also serves as a vehicle for timely expression of the views of the Secretary of the Army and the Chief of Staff and assists in the achievement of information objectives of the Army.

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IN AN organization as vast and complex as the U. S. Army, progress consists of a multitude of advances on many fronts, ranging all the way from morale-building personnel procedures to the development of new weapons and combat concepts geared to the realities of the atomic age. The vast scope of Army progress during the past year is detailed in this Special Issue. As the Secretary of the Army states in the Foreword, it constitutes "a record of which all may be proud."

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ARMY INFORMATION DIGEST
FEBRUARY 1957 • VOL 12 • NO. 2

OSA
FOREWORD • Hon. Wilber M. Brucker • 2

DCSPER
MANPOWER UTILIZATION • Lt. Gen. Walter L. Weible • 8

DCSOPS
MILITARY OPERATIONS • Lt. Gen. C. D. Eddleman • 16

DCSLOG
ARMY LOGISTICS • 24

COA
ARMY MANAGEMENT • Lt. Gen. Laurin L. Williams • 32

CRD
RESEARCH AND DEVELOPMENT • 40

Foreword

A YEAR OF ARMY

MARKING a high point in the development of the techniques of modern warfare, the past year has brought into sharp focus revolutionary changes in the Army's combat concepts. These concepts have a tremendously significant bearing upon the Nation's ability to meet, with adequate flexibility, the maximum and minimum requirements of future warfare.

The closing phase of World War II—to which missiles and the atomic bomb provided a dramatic finale—was actually but a starting point from which a clear-cut synthesis of future warfare has now emerged.

In eleven years of study and experimentation since World War II, the Army has evolved a flexible combat concept which takes into account and provides for the most effective employment of advanced weapons, as well as new methods of deployment for "conventional" or "atomic" warfare. The new concept also brings into play the latest innovations in transport and communications, to assure superior mobility by land and air.

Technological advances in weaponry and in the means for delivering firepower on distant targets were not the only factors which helped generate the new concept. So far reaching and fast changing have been developments on the international scene that flexibility and elasticity have become main guidelines of Army operations.

THE Army cannot—and indeed assiduously seeks not to—commit itself to any particular doctrine, strategy or tactic. In order to serve as a true instrument of the Nation's defense in today's world, it must be prepared for combat action in any sector of the globe—in jungle, arctic, desert or temperate climates—under conditions of limited "police action" or all-out general war with conventional or atomic weapons, as the situation requires.

Traditionally, of course, the Army always has been organized to fight a limited or general war with conventional weapons. But since World War II the atomic bomb and the guided missile have had a revolutionary impact on age-old battle techniques, necessitating complete reevaluation of previously

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THE HONORABLE WILBER M. BRUCKER

Secretary of the Army

accepted techniques and doctrine.

In World War II, for example, a full infantry division of approximately 14,000 men deployed over a five-mile front required a formidable barrage of artillery fire to disrupt its operations completely. Firepower ranges were such that manpower could be massed to a certain extent.

Even the earliest atomic bombs, however, made it evident that troop concentrations on the World War II pattern would be suicidal; and since then the power and lethality of nuclear weapons have increased enormously.

NEW CONDITIONS called forth new solutions. Needed were more powerful, longer-range weapons and a combat plan which provided for rapid concentration of forces from dispersed positions to exploit the shock effect of these powerful weapons, followed by immediate dispersal to avoid furnishing a target to the enemy.

To meet the weapons requirement, the Army launched research programs in cooperation with the Atomic Energy Commission to adapt the atomic bomb for battlefield use. This work proved eminently successful in bringing atomic capability to conventional artillery.

Meanwhile, too, the Army accelerated its rocket, guided missile and ballistic missile projects, to produce the Honest John and Corporal, paving the way for longer-range missiles now being developed.

In the field of surface-to-air weapons, the Army developed and put into operation the Nike Ajax (Nike I), first of a family of antiaircraft weapons designed to destroy any attacking aircraft or missiles. Nike Ajax is the only surface-to-air antiaircraft missile operational and in the hands of troop units today; meanwhile rapid progress is being made in developing the Nike Hercules (Nike B) which will give added lethality to our antiaircraft defense.

AS A starting point in developing new combat tactics, the Army attributed to the enemy a capability in nuclear weapons comparable to its own—in power, quantity and quality, and also in the means to deliver them on the battlefield.

Even an initial study of nuclear warfare—from our own as well as a potential enemy's point of view—underscored the difficulty of employing such weapons with discrimination. The scope of nuclear devastation is such that it may envelop strategically important and unimportant territory, engulfing friend and foe alike.

Even the most determined aggressor might think twice before irretrievably destroying the land, resources and industry which are the goals of his conquest. Moreover, the danger is ever-present that indiscriminate nuclear attack with its widespread "fallout" might jeopardize the aggressor's own troops or damage objectives important to his strategy.

For these reasons, the atomic battlefield is not likely to be saturated by high yield nuclear explosions. But it would be foolhardy indeed not to prepare for the heaviest nuclear attacks. Accordingly, the Army bases its plans on the need to be prepared for the worst possible situation under extreme conditions of nuclear war. At the same time, the Army also prepares for the requirements of more limited warfare.

IN RECENT YEARS the Army has reexamined its concepts and definitions of "battlefield" and "tactical area" as they pertain to ground forces in atomic warfare. Guided and ballistic missiles, it is evident, have expanded the battlefield and tactical area to hundreds of miles or more. Indeed, the battle area may be said to be limited only in terms of ground forces' ability to engage the enemy directly.

This direct engagement with the enemy, it should be emphasized, is a prime essential if advantages in firepower are to be properly exploited by overrunning and seizing enemy territory, along with the troops and equipment located therein, to insure their neutralization in later actions.

In developing plans for the Army of the future, three basic needs or preconditions were recognized as indispensable—namely, vastly increased firepower, new departures in mobility concepts, and revolutionary improvements in communications. The Army moved boldly to achieve these goals in tactical doctrine, troop organization, and research and development.

EXTENSIVE scientific trial and studies have culminated in a revolutionary concept of organization and tactics for the Army in the field. One of many studies contributing to development of this concept has given the Army, in its short title, the descriptive word PENTANA. Analysis of this coined word suggests the nature of the new concept. *Pent* refers to the five principal component units of planned division organization, while *a-na* refers to atomic-non-atomic, reflecting the dual capability envisioned for this new organization.

A product of intensive Army studies on organization and tactics required for future warfare, Pentana today covers a number of concepts still under experimentation. The 101st Airborne Division, for example, has been reorganized to reflect the Pentana concept, and steps are under way for reorganization of other units. Far reaching

changes are involved.

Until now, the standard division has consisted of three regiments as its principal units, and these represented the maximum span of the division commander's control. If more than three regiments were needed in combat, the commander either had to call for reinforcements or dispatch smaller units. Since only the regiments had their own supply capabilities, a continuous source of supply from rear areas was required.

Under the Pentana concept, a pentagonal organization may be set up at each principal echelon of command, thus giving the commander a wider span of control with five principal units instead of three. Within the division, each of these basic units combines the firepower and supply capabilities of the regiment with manpower somewhat greater than in the present battalion. This arrangement makes possible an elasticity and flexibility to meet the maximum requirements of all-out nuclear war, while preserving the capability in both weapons and doctrine to cope with smaller, non-nuclear wars.

Use of missiles in future warfare will preclude any fixed location or size of combat zones. Battle areas may extend up to hundreds of miles in width and depth.

Depending upon the situation, attacking forces may either stand off and use tactical atomic weapons to penetrate enemy defenses, then follow up with rapid exploitation with mobile forces, or they may seek to engage the enemy in close-up action which will reduce the enemy's opportunity to use nuclear weapons for fear of destroying his own troops. In either case, whenever a breakthrough is accomplished, mobile forces will plunge into enemy rear areas by land and air, before mushrooming again to cut off and neutralize the entrapped forward forces.

Such an action might be carried out over a great distance in only a few hours. Accordingly, our combat units must be ready to move and fight on a moment's notice.

FLEXIBILITY is the keynote of troop organization under the Pentana concept. But the effectiveness of the Pentana organization in turn depends on superiority in four vital fields—firepower, mobility, communications, and manpower.

In the realm of firepower, the Army, thanks to its pioneering work begun more than a decade ago, today has the finest arsenal of short and medium-range missiles in the world. Men and units are already trained to handle these weapons. The retaliatory power of these weapons with crews at the ready in widely dispersed launching sites gives the United States a war deterrence of broad and inescapable meaning. (See special issue on "The Army's Missiles," December 1956 DIGEST.)

At the same time, the Army is maintaining its unmatched skill in conventional artillery weapons capable of delivering nuclear and non-nuclear blasts.

THE revolutionary change in mobility is perhaps best epitomized by a comparison of World War II conditions with today's requirements. Prior to and during World War II, equipment was designed to move under its own power (usually by road, as opposed to

cross-country) or be moved by air or surface transport. Heavy weight in tanks, armor and other equipment was considered necessary, and was compensated for by stepped-up motor power. Equipment that could move or be towed in excess of 40 miles an hour was the exception. Convoys moved at a 15-mile-an-hour pace, 25 in emergencies. Twenty-four hours from the time a division movement order was issued until it detrucked and dispersed just 100 miles away was considered good time.

In the future, entire units must be able to move that distance in a fraction of that time. To make this possible, the Army is taking action to remove all excess weight from vehicles and equipment, to incorporate lighter materials in design, to devise new methods of wheel and track suspension to enable vehicles to traverse any type of terrain. Standard equipment is being redesigned and new equipment developed to facilitate air transportability.

Whereas during World War II, men and equipment trained and outfitted for air movement were the exception, it is foreseen that in future wars men and equipment *not* capable of being transported by air will be the exception. Even the Army's Nuclear Package Power Reactor, capable of producing heat and electricity for a community of 5,000, is being designed so that its components can be shipped by air.

Organic Army Aviation also is indispensable to mobility in future wars. On it depends the Army's capability for moving men and equipment over short distances as fast as constantly changing battle situations may require. Army aircraft will have a multitude of vital uses—for observation, troop movement in combat zones, cargo lift and delivery of critical supplies, reconnaissance, liaison and communication, casualty evacuation, and target acquisition.

VITAL improvements are underway in the entire field of Army communications—not only in the transmission of information within units, but also in acquisition and relay of combat intelligence.

Lighter weight, more durable, longer-range equipment is being introduced to maintain cohesion within and between Army units. Innovations range from small radios built into the helmets of individual soldiers to portable television units, carried in drone aircraft or jeeps.

To determine, as a part of an overall evaluation, the effectiveness of communications in a reconnaissance role, a new concept called Skycav was tested during the year as a part of Operation Sagebrush.

Normally, a reconnaissance force of World War II type might consist of a battalion of men with several tanks covering a relatively small area. But as applied during Sagebrush, Skycav employed helicopters to move men and equipment, and a platoon to test electronic and other devices for detecting the enemy at night as well as by day; it also included light tanks, a reinforced infantry platoon equipped with mortars, and recoilless rifles and light machine guns. Such a unit's potential scope is limited only by the radius of its aircraft.

IN ALL their studies, Army planners have uncovered nothing

to indicate that electronic devices or improved weapons can replace the need for men. Nor will reorganization of the division and field Army under the Pentana concept lessen the Army's overall manpower needs. On the contrary, the vast width and depth of combat fronts will expand the areas of deployment and thus increase the quantitative need for men. Extra manpower will be required to supply widely dispersed units. And the probability of greater casualties in atomic warfare also cannot be overlooked.

In event of war, time becomes one of the most critical and precious commodities. At the moment a large-scale, long-range enemy attack is mounted, the Army must be instantly ready, with troops fully trained and at their stations, poised for action. Its soldiers must be tough and self-reliant, capable of sustaining themselves and fighting back under the dispersed and rapidly changing conditions of nuclear war. The soldier who maintains and operates complex battle equipment must himself be a highly skilled technician. This calls for long months of training, schooling and unit exercises—all this *before* the critical need arises.

Wisdom therefore dictates that as sizable an Army as possible be maintained until the threat of aggression no longer stalks the earth. Meanwhile, approximately 40 percent of the Army's strength continues to stand guard in 73 countries as a potent deterrent to Communist aggression.

DURING the past year, the flexible outlines of the Army of tomorrow have been blueprinted. New methods of troop organization have been crystallized; and the changeover is underway.

The job of polishing and refining these new combat concepts must continue. Its success will depend upon the full understanding and support of the American people.

If maximum safety for the United States is to be assured, the Congress and the American people must understand the Army's role and provide for an Army unencumbered in mission or capability.

The American people fully realize that there is no short-cut to national security. They realize that the Army's needs are *their* needs.

Among other things, these needs include missiles, aircraft, manpower, research and development, and industrial preparedness. But just as the nature and scope of future warfare cannot be delimited, neither can the Army arbitrarily limit its thinking and planning. Indeed, our recent advances foreshadow that the changes of the next decade may be even more spectacular than those of the post-World War II era.

THE outstanding accomplishments in the fields of Manpower, Military Operations, Logistics, Management, and Research and Development—achieved during the past year and highlighted in this issue—make abundantly clear that flexible planning for the future extends not only to combat tactics and organization, but to all aspects of Army operations.

This is a record of which all may be proud. From it, all may benefit in terms of increased strength for national security and survival.

The Army records impressive gains in

MANPOWER

TODAY'S requirement by the Army for greater flexibility in organization, equipment, and operations demands even greater adaptability by Army members. New and more imaginative tactical concepts cannot be executed without imaginative leaders, officers and enlisted, from the squad level to the top of the chain of command. New and more technical equipment is worthless without technically qualified personnel capable of operating that equipment with maximum efficiency.

Thus there is little room for the dull clod in our Army of today. The "professional soldier" becomes a true professional in the highest sense of the word. He must be adaptable to changing demands for the employment of more complex equipment and adaptable to bold new concepts of operations on the field of battle. He must possess not only a broad military background of tactics and strategy in the classic sense but also must have a working knowledge of the new technical fields.

This is a large order, for it is obvious that a requirement for such high quality personnel is not easy to meet. The competition for people of this caliber is intense. They are in great demand by industry, the professions, and the other Services. So we cannot reasonably expect more than a fair share of top quality people among our accessions to the Army. At the same time, large numbers of people are still required to keep the Army operational. No part of the entity can be treated independently of the others if the total force is to be ready and effective.

During the past year, the Army's major manpower efforts have been devoted to achieving a more powerful, higher quality Army better prepared to meet the demands of modern and future warfare—an Army geared to accomplish added missions within reduced personnel resources, and capable of inducing qualified military and civilian personnel to make the Army a career.

The principal developments, including those which have detracted from as well as those which contributed to the achievement of our objectives, may be summarized as follows:

UTILIZATION

LIEUTENANT GENERAL WALTER L. WEIBLE

Deputy Chief of Staff for Personnel

STRENGTH

Military, Active Army. The Army reduced its total active military strength during the year by 83,518, from 1,109,296 to an end position of 1,025,778.

Civilian. The overall number of direct hire civilian employees dropped from 461,986 to 434,691, or six per cent. In addition, the number of foreign national civilians employed by the Army dropped from 215,598 to 185,392.

Reserve Forces. At the end of Fiscal Year 1956 (30 June), the total number of Ready Reservists in pay status was 610,525, an increase of 89,846. Of the total figure, 404,403 were in the National Guard and 206,122 in the Army Reserve.

There were 2,321,653 personnel in the entire Ready Reserve. This figure includes those participating in training with pay, those participating in training without pay, and those not participating in training but required to remain in the Ready Reserve because of their statutory obligation. This figure will be reduced to 1,692,235 by 1 July 1957 in order to comply with the maximum strength authorized under the Reserve Forces Act of 1955. The reduction will be accomplished through a continuous screening process now in operation.

ALLOCATION OF MANPOWER

THE Operating Forces of the Army—combat forces and their integral supporting elements—comprised 69.2 percent of the total Army strength at end FY 1956.

	End FY 1955 Percent	*End FY 1956 Percent*
Operating Forces	68.3	69.2
Supporting Forces	9.0	8.7
Special Activities	4.9	6.3
Training Forces	15.8	13.4
Transients & Patients	2.0	2.4

Special Activities cited are those which do not contribute directly to the accomplishment of the current Army mission. They include units and elements whose missions are of an international, joint, liaison, diplomatic, political, research, or other special purpose nature.

CAREER ATTRACTIVENESS

DURING Fiscal Year 1955 there were a number of important actions affecting career attractiveness—increased pay, FHA loans to active duty personnel, the establishment of the GYROSCOPE unit rotation plan, more attractive uniforms, a change in insignia to distinguish NCOs from specialists, and an increase in the reenlistment bonus.

Continuing effort resulted in these important developments:

Housing. One of the most pressing and significant morale problems facing the Army today is the lack of adequate quarters to accommodate married personnel, both officer and enlisted, who, in the main, comprise the "hard-core" of key career personnel essential to efficient military operations. Such personnel represent the mature, stable element that provides the Army with the type of competent leadership needed. If this category of personnel is to be retained, greater housing accommodations will have to be made available.

Funds have been appropriated by the Congress for increased on-post construction and Wherry and Capehart housing, developed by private capital, have proved helpful. Although much has been done to alleviate the situation, there still are not sufficient quarters available, both within the United States and at the many overseas stations. This continuing problem is receiving the greatest possible support by the Secretary of the Army personally.

Medical Care. The most important recent development in the Medical Care Program was the enactment of the Dependents Medical Care Act. In the past, medical care for dependents has been furnished on a facilities-available basis at Army installations only after all requirements of military personnel had been met. Since the Dependent Medical Care Act became effective on 7 December 1956, dependents are authorized to receive medical care in civilian hospitals (provided government medical facilities are not available) with the government paying most of the cost.

Survivors Benefits. The Servicemen's and Veterans' Survivor Benefits Act, which became effective 1 January 1957, is one of the most important legislative actions taken to improve the financial security of military personnel. It provides a new basis for compensation for surviving widows and children and, under certain circumstances, surviving parents, of members who die while on active duty or from service-connected causes after they leave active service.

The law also provides Social Security coverage for all active duty members of the military service. Upon reaching the age of 65 they will receive both their retirement pay and Social Security benefits. The law continues the lump sum death gratuity in force, but increases the minimum amount thereof from $468 to $800 and reduces the maximum from $6857 to $3000.

The Act makes drastic changes in insurance features for service personnel. The $10,000 free insurance under existing law is terminated. USGLI and NSLI insurance rights may be reinstated by persons holding either of these policies, subject to certain conditions.

Stabilized Assignments. In addition to the expense involved, frequent permanent change of station movements have worked a definite hardship on military personnel and their dependents. Stabilization of assignments for military personnel has been improved during the past year. Personnel are now remaining at one station for at least 12 months and in some instances for as long as 48 months where training, continuity, ability are required.

Regular Officer Augmentation Act. Much publicity has been given to this Act and its implementation. (See October 1956 DIGEST.) The general provision is to increase the statutory authorization for Regular Army male and WAC commissioned officer strength from 30,600 to 49,500 and provide for a more realistic Regular commissioned officer structure to meet our needs for the foreseeable future. It also increases the Army's mobilization potential. At present there are approximately 26,000 regular male and WAC commissioned officers in the Army. Under authority now in effect, it is planned to increase that to about 35,600 by July 1958 and to 39,600 by 1963. Further increases will depend upon Presidential decision.

Promotion of Outstanding Officers. Since the Korean operations and prior to this year, little or no opportunity had been provided for truly outstanding officers to advance more rapidly than their contemporaries. This tended to stifle initiative and caused officers to leave the service in favor of civilian employment. The "five per cent" system used in the years 1951-1953 was discarded because many outstanding officers occupied positions where their ability was not recognized by general officers who had the authority to submit nominations. A new policy, introduced during the year, permits consideration of captains, majors, and lieutenant colonels who have completed a specified number of years in grade for temporary promotion ahead of the time when they would normally be eligible for consideration by a selection board. Selections are made entirely from Department of the Army records.

Maximum number of promotions to be made under this program will be fifteen per cent of the total promotions anticipated during the fiscal year to colonel, and ten per cent to major and lieutenant colonel. This policy was first applied by the Selection Board which met in July 1956. Of the total of 440 selected by that board for promotion to temporary colonel, 60 will be promoted earlier than their contemporaries.

Scientific and Professional Personnel. The Scientific and Professional Personnel Program was given continued emphasis during the year. This program is aimed at identifying and properly utilizing those enlisted personnel in the Army who have college degrees in engineering and in the physical, biological, sociological and business sciences, so the Army can derive maximum benefit from their education and experience.

Several controls have been established to maintain effective utilization of this group of personnel. First, all initial assignments and reassignments between major commands are effected by name by the Army. Second, before any assignment is effected, it is reviewed to insure that lesser skilled personnel cannot adequately perform the job. Third, individuals assigned under this program are permitted to correspond with The Adjutant General's Office, Department of the Army, if, after a period of 90 days on the job, they feel they are being improperly utilized. Finally, soldiers in this program are interviewed periodically in a continuing survey of the effectiveness with which the Army is using its skilled manpower. The most recent survey found that 97 percent of the enlisted men in this program were being properly utilized.

Medical and Dental Officer Career Incentive Act. This Act provides for substantial increases in pay for Medical and Dental officers. A considerable improvement in the gain of Regular Army Medical and Dental officers has already taken place.

Specialization Programs. The complexity of the modern Army has demanded a greater degree of specialization than ever before. Specialization programs have been established in the fields of Army Aviation, Intelligence, Civil Affairs/Military Government, Information, Research and Development, Atomic Energy, Logistics, and Legislative Liaison. Aside from the requirement to maintain branch qualification and for attendance at appropriate military schools, it is now possible for officers to remain in their chosen field of specialization.

Retirement in Highest Grade Held. Proper presentations to Congress resulted in the indefinite extension of the authority, which would have expired at the end of 1956, for all service personnel to retire in the highest grade satisfactorily held for six months, regardless of whether that grade was permanent or temporary.

Readjustment Pay for Reservists. The effective presentation of this problem to the Congress resulted in a bill which authorizes a lump sum payment to Reserve officers who are involuntarily separated. Thus those reservists who must be separated because of imbalances and limitations are financially provided for while reestablishing themselves in civilian life.

Enlisted Promotions. The current stagnation of promotions in the higher enlisted grades has been caused by accelerated promotions during World War II and the Korean conflict and subsequent strength reductions. To correct this condition, a program was started during the past year to maintain a promotion flow to senior noncommissioned officer grades and to insure a vital, young noncommissioned officer corps.

The program, now in effect, precludes the reenlistment, extension of enlistment period, and extension of active duty tours of personnel who: have completed thirty years' active Federal service; have completed twenty years' active Federal service and have attained 55 years of age. This initial action is the only one of the overall program which has been effected. It will improve enlisted promotion capabilities over the next several years,

particularly after 1960. Other actions are now being initiated.

ENLISTMENTS

DESPITE the actions taken to increase the attractiveness of the Army, voluntary enlistments through the Army Recruiting Service decreased 21 per cent during the year, as compared to Fiscal Year 1955. This was attributed in part to changes in the factors affecting the willingness of young men to volunteer, including reductions in Selective Service calls and the implementation of the Reserve Forces Act.

Another reason was a reduction in the acceptance of men of poor mental qualifications (Category IV) from 23 per cent of the total voluntary enlistments by men of no prior military experience to 18 per cent.

At the same time plans were launched for increasing voluntary enlistments of higher quality personnel. These included a continuation of the very successful Educational Liaison Program, in which Army personnel participate in panel discussions at educational conventions; increased national publicity; improved training and selection of recruiting personnel.

As of 1 July 1955 the 572,000 enlisted personnel in the Regular Army represented 58.0 per cent of the total Army enlisted strength of 985,659. By 30 June 1956 this number had increased to 599,600, or 66.2 per cent of the total Army enlisted strength of 905,711.

CIVILIAN PERSONNEL

PROGRESS was made in the Army's civilian personnel programs during Fiscal Year 1956:

Shortage of Specialists. Measures to overcome this problem included full use of higher pay rates for engineers and scientists authorized by the Civil Service Commission, imaginative recruiting programs with special emphasis on securing recent college graduates, and use of the authority granted by law to contract with universities for training Army employees.

Fortunately, many scientists and engineers remain with the Army, though offered higher salaries elsewhere, because of the opportunity provided by the Army for the development and free use of their professional skills.

Cooperative education programs have been undertaken at a number of Army installations under which college students provide valuable engineering assistance while receiving on-the-job training in periods of full-time employment, alternating with periods of college attendance. Many of these students accept employment with Army installations after graduation.

In addition, engineering and scientific employees have been encouraged to improve their own qualifications by attending courses at conveniently located universities. The Army arranges for such courses, but the cost is borne partly or wholly by the employee.

In spite of these actions, the shortage of qualified specialists for critical civilian positions remained one of the Army's most pressing personnel problems.

Career Programs. To provide a steady flow of talented employees capable of assuming top scientific, technical, and management jobs in the future, and to more readily attract capable personnel in vital

occupational areas, the Army placed increased emphasis on planning career programs for specific occupations. These programs will include provisions for recruiting, appraising, and developing individual civilian employees within specific occupations crossing organizational lines within commands and the Army Establishment.

DURING the past six months, the Army has developed a basic regulation to provide necessary guidance to chiefs of functional areas who will be responsible for the establishment of civilian career programs. The Comptroller of the Army, the Director of Civilian Personnel, the Army Safety Director, and Chiefs of Ordnance and Engineers, the Chief Signal Officer and the Quartermaster General have established career programs.

Career Status. Action has been continued to convert all civilian employees to career status. Only 50 per cent of the Army's civilian employees in December 1954 held permanent type status. Steps to convert these employees to career status were taken during 1955 under various legislative authorizations. By 30 June 1956, 94 per cent of Army employees in continental United States had attained career or career-conditional status. Job security and other benefits of career employment have been a factor in reducing turnover of civilian employees and in attracting qualified scientists and technicians.

Civil Service. Executive Order 10641, effective 1 April 1956, authorized Federal agencies to transfer United States citizens employed in foreign countries from the excepted service to the competitive Civil Service. Long preparation by the Army for this authorization resulted in the immediate transfer to the competitive service of a large number of eligible employees. By 30 June a majority of the employees eligible had been certified for conversion. This has helped stabilize the Army's supporting force in foreign locations. In addition, it is now easier for the individual employee to transfer to positions in the United States.

RESERVE FORCES

DURING the year the overall position of the Army's Ready Reserve components was improved materially.

Screening. The Army took positive action to insure the availability of qualified personnel for mobilization by initiating two separate programs aimed at putting the right people in the right assignments and then being reasonably sure that they will be available for service when called.

The first program is the accelerated Emergency Reinforcement Assignment of recently-trained reservists who have a statutory Ready Reserve obligation, but who are not required by law to train in existing unit vacancies in which their skills will be used when the units are ordered into service.

The second is the continuous screening of the Ready Reserve to make certain that the attrition, resulting from individual disqualifications or priority claims on their skills when mobilization is ordered, will be minimized. The result by 1 July 1957 will be the retention of 1,692,235 reservists in the Ready Reserve, and the discharge or

transfer to the Standby Reserve or Retired Reserve of approximately 900,000 who either do not meet retention criteria or do not desire to stay in the Ready Reserve.

Reserve Forces Act of 1955. As of the end Fiscal Year 1956, 45,016 men had come into the Army Reserve under the provisions of RFA during the ten months since the Act was passed.

Of this number 13,012 chose the option of six years obligation with two years active duty; 27,272 chose eight years obligation with six months of active duty for training; and 4,732 men with prior service but no mandatory training obligation agreed to one year of training in Ready Reserve units.

During the year, the Army exerted every possible effort to strengthen the reserve components through the maximum use and support of the provisions of the Act. (See February 1956 DIGEST.) One of the greatest, if not the greatest, publicity campaigns in Army history was conducted with emphasis on pamphlets, posters, window cards, billboard posters, radio, television and motion pictures. Six outstanding films were produced, one of which, "The Whites of Their Eyes," received the George Washington Honor Medal from the Freedoms Foundation.

The quality and intensity of the publicity campaign was attested to by the award to the Army of the "Silver Anvil" trophy by the American Public Relations Association for the best public relations program conducted by any governmental agency during the year. The Army worked closely with 370 national organizations in obtaining support for the Reserve programs, including the American Legion, the U. S. Chamber of Commerce, Boy Scouts of America and numerous academic, industrial, trade groups.

THESE impressive accomplishments will not lessen Army endeavors to increase service attractiveness. A Department of Defense committee of experts, both military and civilian, in which the Army is represented, is making an exhaustive study of basic pay which is expected to result eventually in increased rewards to officers and enlisted personnel who possess leadership and technical potential.

Significant data is being gathered and analyzed in order to develop positive and beneficial policies in the following fields—appropriate compensation for duty in remote and isolated areas, a reevaluation of subsistence and quarters allowances, reenlistment bonuses, reexamination of reenlistment qualifications, retraining of personnel in surplus MOS's, requirements for additional obligated service in return for advanced schooling, and many others.

Additionally, the whole field of administrative practices of the Army as they relate to improved human relations and greater job satisfaction are being constantly reviewed. The goal is career retention, with special emphasis on inducing the young, capable individual to complete a twenty to thirty year Army career. All of these efforts should insure a program which will offer all of our personnel a rewarding and satisfying future. For the Army, increased efficiency, lower training costs, and improved combat effectiveness should result.

New developments in firepower, mobility, communications step up the potential of

MILITARY

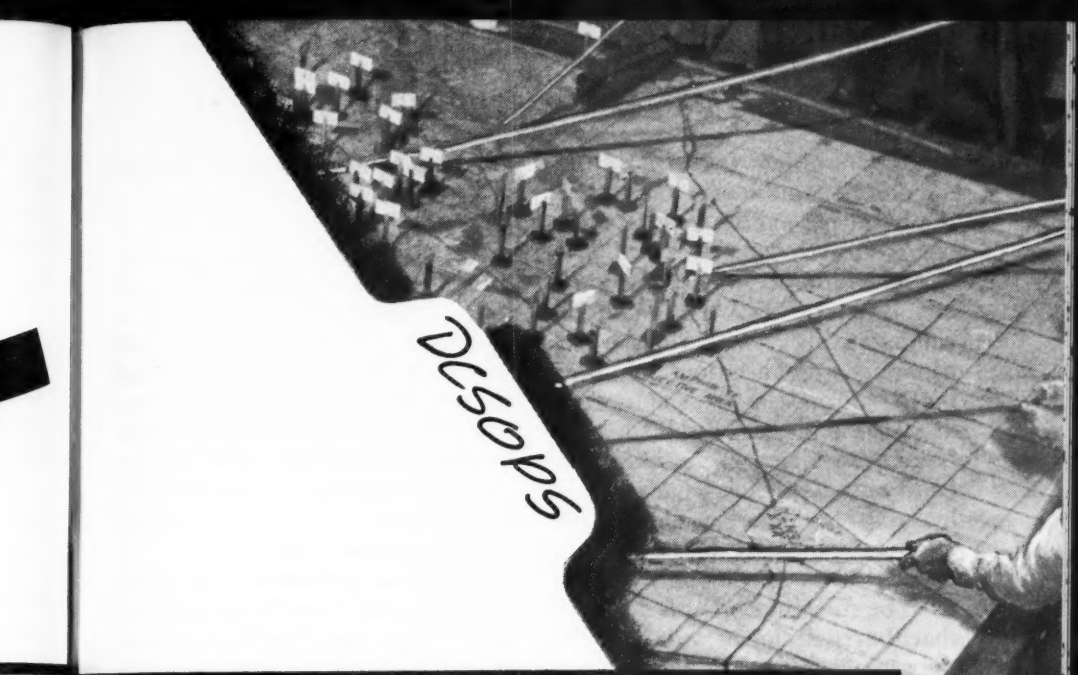
THE ARMY is responsible for preparing forces for the effective prosecution of war on land. Indeed, no nation can accomplish its war objectives without control of the land—its people and its resources. The operations of air and naval forces are dependent upon the control of land areas. Only land forces can defend the base areas essential to the prosecution of war.

Our Army must be prepared to engage in any type of war in any area of the world where it is in the interest of the United States to commit military forces. This requires that the Army be capable of operations under all conditions.

While the Army emphasizes the attainment of a fully effective capability to conduct atomic warfare, ground forces must retain a capability to win wars in which atomic weapons may not be used. However, at all times Army forces will be operating under the continuous threat of atomic attack and must be prepared for such attack.

Today's Army is undergoing major changes to meet the challenge of the future. New tactical concepts are evolving to reflect the changes in weapons and equipment made possible by technological advances. Army organizations are being modified accordingly.

Army operations have been significantly affected by new developments in the fields of firepower, mobility and communications. The most dramatic of these developments involve the integration of atomic weapons and guided mis-



OPERATIONS

LIEUTENANT GENERAL
C. D. EDDLEMAN
Deputy Chief of Staff
for Military Operations

siles into the Army's arsenal, and the introduction of air mobility and new means of achieving ground mobility on the battlefield.

FIREPOWER

THE advent of atomic firepower in ground warfare is the single most significant factor influencing Army concepts of operations and organization. These weapons provide massed firepower of unprecedented destructiveness. With a wide range of weapons available, Army commanders are able to deliver firepower when and where needed and in the amount required. Because of these developments the concepts of land warfare, both offensive and defensive, are undergoing major changes.

In general, the most significant

change resulting from the introduction of atomic weapons is that the zone of combat operations is enlarged.

The constant threat of atomic attack requires that Army units be comparatively small and self-contained organizations of combined arms, possessing great firepower and mobility. They must be able to operate semi-independently on a battlefield characterized by dispersed formations. Units must be prepared to exploit the effects of atomic weapons, yet they must be so organized and deployed that they will not be vulnerable to the atomic fires of the enemy.

Army firepower today includes the familiar conventional artillery weapons, the 280-mm. gun with its atomic and conventional capabilities, guided missiles and rockets.

The Army now has two operational field artillery missile systems—Honest John and Corporal. Both missiles can deliver nuclear and other munitions. The Honest John rocket is a division or corps weapon with a range comparable to heavy artillery. The Corporal guided missile is essentially a corps weapon with much greater range.

In addition to these surface-to-surface weapons, the Army also employs the Nike surface-to-air missile in defense of the United States from air attack. The present Nike is only the first in a family of antiair weapons.

All of these weapons are operational today. Significant strides have been made in providing today's Army with atomic delivery capabilities, and in integrating missiles and rockets into the Army weapons family to replace some artillery means. (See special issue on "The Army's Missiles," December 1956 DIGEST.)

IN FUTURE weapons systems, the Army is seeking increased range, greater accuracy, and lighter weight in order to provide a higher degree of battlefield mobility and air transportability. Future weapons will be characterized by vastly increased firepower and greater range. Increasingly, conventional artillery systems will be replaced by missiles and rockets.

Wherever practicable, these future weapons will be capable of delivering either atomic or conventional munitions in order to insure operational flexibility. Atomic delivery capabilities will be integrated into the Army structure down to and within the divisions, but the capability to deliver conventional fires also will be retained.

While Honest John and Corporal are the only field artillery missiles currently in the hands of troops, both in the United States and overseas, many new weapons are in advanced stages of development. The Dart is a small, lethal missile which is particularly effective in destroying armor and in assaulting strong points. The Little John and Lacrosse are being developed and in the near future will replace or supplement the Honest John. These simpler, lighter weapons will have improved accuracy and a higher rate of fire than existing systems.

In the near future, the Redstone surface-to-surface missile will go into service, enabling the Army to deliver firepower at extended ranges and with great accuracy.

WHY DOES the Army need weapons able to fire at these great

ranges? Because the combat zone is increasing in depth. The role of artillery is unchanged—*i.e.*, to support the land battle with firepower. The Army must be in a position to engage enemy weapons and other targets that can directly affect land battle. It can be expected that friendly forces will be brought under attack by enemy long-range missiles. The commander responsible for the success of ground operations must be capable of countering and neutralizing this threat with weapons immediately available and responsive to his control.

Surface-to-surface missiles, those the Army has today and those of the future, are required for the Army's land combat mission. But the Army also has a mission to provide antiaircraft defense of the Continental United States and in combat theaters. Enemy capabilities, both in aircraft and missiles, determine the Army's requirement for antiair missiles.

The present Nike missile which is deployed in defense of critical areas in the United States is only the first in the Army family of surface-to-air missiles. The Nike-Ajax was designed to engage jet bombers, and is capable of destroying any known aircraft. However, the current version of the Nike is only a beginning in antiair missiles.

The Army plans to convert its present air defense installations to launch Nike-Hercules. This new version has greater range and speed, operates at greater altitude and carries a far more lethal warhead than Nike Ajax.

Nike weapons are intended for use at long range and high altitude. To provide an optimum defense at all altitudes the Army is developing a complementary missile system to destroy low-altitude targets.

In carrying out its responsibility for antiaircraft defense, the Army has developed and employed the first operational antiair missile system in the free world.

MOBILITY

AS HAS BEEN indicated, the Army must be prepared to engage in combat anywhere in the world. Full effectiveness of land forces can only be realized if there are the means available to provide maximum strategic mobility.

No less important is mobility on the battlefield, as a means of reducing vulnerability to enemy action and to exploit the effects of the greatly increased firepower available to support ground operations.

The strategic airlift necessary to enable the Army to move rapidly to operational theaters must be provided by the Air Force, just as the Navy must provide the fast surface means necessary for oversea movement. But to achieve this kind of mobility, Army equipment must be lighter in weight and air-transportable, insofar as feasible.

IN the realm of tactical mobility, the Army requires means which will enable combat forces to concentrate rapidly from dispersed formations at the focal point of attack, and then as rapidly disperse again to reduce vulnerability to enemy counteraction. Also, Army commanders must be capable of moving supplies, troops and equipment within the battle area.

This kind of mobility requires improved battlefield mobility both on the ground and in the air. The Army needs lightly armored, air-

transportable vehicles that will give true cross-country mobility. The Army also needs improved aircraft capable of operating from unprepared fields in the combat zone.

In the field of ground mobility, the Army is developing lightly armored carriers. These amphibious, cross-country vehicles can carry personnel, equipment, and supplies. They can be used as weapons platforms, or as command or reconnaissance vehicles. They provide protection against small arms fire and fragmentation, and against some of the effects of atomic weapons. A most important attribute is that they can be lifted by medium transport aircraft.

For the more immediate future the Army is developing a new family of tanks. While missiles will play an increasingly important antitank and assault gun role, it is not expected that the tank will be eliminated from existing organizations in the foreseeable future.

The M-56 is a lightweight, self-propelled 90-mm. antitank and assault gun developed primarily for airborne and airlanded forces. It weighs about 16,000 pounds and has been parachuted successfully from C-119 aircraft. This weapon will provide a greater degree of antitank protection and assault gun support for airborne operations than has been previously possible.

The Army's mechanical mule is another of the new ground vehicles coming into service. It is a lightweight, general purpose carrier having great battlefield utility.

RUNNING through all of these developments in ground vehicles is a common emphasis on air transportability so that Army forces, with their equipment, can be moved by air to any trouble spot. But the Army also needs air mobility on the battlefield. This is a fundamental purpose of the Army aviation program.

Air vehicles are essential if the Army is to have the increased mobility necessary for combat operations. In many situations, victory will be on the side of the most mobile, but not necessarily the biggest, battalions.

Army aircraft must be capable of living with ground forces and operating in the combat zone. This requires rugged design and the ability to operate under primitive conditions. Helicopters, convertiplanes and fixed-wing aircraft are necessary for target acquisition, command, liaison, logistic support, troop movement, evacuation, communications and for other combat roles. At the present time, seven branches require Army aircraft.

With a combination of these ground and air mobility means, the Army will attain greater and greater mobility. To survive on tomorrow's battlefield requires that ground forces have immediately available all the necessary means of tactical mobility to move troops, equipment and supplies within the combat zone. Only then will it be possible to exploit the effects of atomic firepower. It is this mobility differential over the enemy, coupled with the ability to mass firepower, that can insure victory in battle.

COMMUNICATIONS

INCREASED firepower and improved mobility of Army forces are having a major effect on tactical concepts. Operations on an ex-

tended battlefield with highly mobile, dispersed formations will impose new demands on the Army communications systems. Problems of control and of target acquisition will assume far greater importance. Communications facilities needed will be far in excess of those previously required.

The Army is developing signal equipment which is lighter in weight, and capable of operating at greater range. This equipment must be dependable and resistant to enemy electronic countermeasures. Progress also is being made in other fields of communications such as television, photography, radar, infrared, and electronics.

TACTICAL CONCEPTS

ADVANCES in firepower, mobility, and communications are producing major changes in tactics and in organization, and in the methods of employing ground forces in warfare. The battlefield of tomorrow will be very different than in the past.

In an atomic war, the battlefield will be larger and combat action will be characterized by rapid movement and extended intervals between units. Formations will be dispersed, but will be capable of fleeting concentration to seize an objective. Mass formations to achieve a breakthrough or to mount an assault will be a thing of the past. Concentrations of men and materiel on the scale typical of World War II would be suicidal.

In a typical World War II conventional type of defense, for example, the bulk of the units were far forward, including not only the front line elements, but also the support elements, control media, and logistic installations. An atomic weapon delivered at any point along the main battle position would have produced major losses.

In a defense of the same area in the future, the battlefield would be many times as deep. Divisional sectors would be greatly increased in depth. Troop concentrations would be dramatically reduced with troops dispersed throughout the combat zone.

Such a defense in depth requires a reorganization of the battlefield, and new tactical concepts. Mobility is of the essence. Relatively small battle-groups of all arms must be capable of air movement within the zone of action and must be able to move cross-country. In this type of defense, atomic weapons would not fracture the battle position, although there would be disruption and damage.

Defensive action will consist of a rolling with the punch. There will be no rigid main line of resistance. The defense will be elastic; enemy penetrations of the defense position will be normal.

As the momentum of the attack is spent, the enemy forces become vulnerable to atomic weapons and are counterattacked from the flanks and rear by the defending battle groups and by highly mobile reserve forces brought up from the rear. To be successful, these tactics demand that the Army possess the necessary means to fix the location of enemy forces, and the necessary command and communications facilities to permit the close coordination of the movement of counterattacking forces with defensive fires. Possibly the most important need is competent junior leaders, both commissioned and

noncommissioned, who can exercise the judgment and initiative essential in conducting defensive operations of this type.

TURNING to offensive operations in the future—a river crossing action, for example—the operation would be conducted in accordance with carefully coordinated movement tables and scheduled fires. Because of the constant threat of atomic attack, the depth of the zone of operations would be greatly increased and units would be dispersed. The attacking forces, consisting of highly mobile mechanized battle groups, would be in concealed positions some 35 to 40 miles to the rear of the river line. Only minimum activity would be permitted in forward areas.

The attacking formations would move out and cross the river in amphibious vehicles. Landings on the far bank may be timed to coincide with the arrival of air-dropped and air-landed forces. Depending upon the circumstances, the objective area may or may not have been subjected to prior atomic attack.

Under this concept of operations, all effort converges on the objective in a fleeting concentration. After seizing the objective area, the attacking forces disperse as rapidly as possible to reduce their own vulnerability to atomic attack. The entire operation is characterized by speed and full exploitation of weapons effects, while avoiding any protracted concentrations which invite atomic attack.

This same offensive pattern is suited to operations conducted at any distance behind enemy lines. The only limiting factors are the radius of operations of aircraft and land vehicles and the ability to provide the necessary combat and logistic support.

ORGANIZATION

AS HAS BEEN indicated, the battle group will be the basic tactical element in future Army organization. Just what these battle groups will be called is not yet certain, but no matter what the name they will be very different from regiments and battalions as the Army has previously understood these terms.

However, studies and tests conducted thus far by the Army indicate that the division will continue to be the basic unit of combined arms. For the foreseeable future, there will continue to be a need for the three types of divisions—infantry, armor, and airborne.

The 101st Airborne Division, recently reactivated at Fort Campbell, Kentucky, has been organized to take full advantage of new weapons. Similarly, the organization of the infantry division and smaller units is being studied continuously to adapt them to the conditions of atomic warfare.

The organization of the 101st Airborne Division is designed to test a unit equipped specifically for airborne operations. All of its equipment will be air transportable. The division contains five combat groups, each of which is capable of independent operations.

In addition to the five combat groups, the division includes a command and control battalion, a signal battalion, an engineer battalion, a composite artillery group, and a support command. Significant features of the 101st Airborne Division organization are:

- The division is organized on a pentagonal basis, with five subordinate elements at each echelon of command, rather than three as in the present triangular division.
- The division has an organic atomic capability with the Honest John battery.
- Functional logistics are provided by the support command.
- The division has augmented capabilities for target acquisition.

The number of aircraft required to lift the assault echelon of the new 101st Airborne Division is approximately the same as for the assault echelon of other airborne divisions, but the new organization will have equipment which provides significantly greater combat power. Whereas the present organization has heavy equipment in the follow-up echelon, the new divisional organization emphasizes the primary role of airborne assault, with less consideration to sustained ground combat operations.

On the basis of further studies and tests, it can be expected that there will be changes made in other organizations.

THE ARMY can no longer think in terms of an approaching atomic age. That age is here. Today's Army is an atomic Army with capabilities which were unheard of a few short years ago. Present trends may be expected to continue.

In both the offense and defense, tactics will be tailored to meet the needs of an atomic battlefield. Victory will belong to the side possessing superior mobility, superior firepower, and superior command control. Full realization of the potential of new weapons and equipment, however, will be dependent upon reliable communications.

There will be increasing emphasis on operations conducted under conditions of poor visibility and at night to reduce susceptibility to detection and vulnerability to atomic fire. Battles will consist of short but violent clashes. Real estate will be unimportant in itself. Rather, land areas will be important primarily as a means of controlling the battle or creating conditions favorable for the employment of improved weapons.

Offensive operations in the future normally will be made from column formations. The fleeting concentration of men and materiel necessary to attain the objective will be achieved by greater ground and air mobility. Overwhelming firepower will be concentrated in support of the attack, delivered by all forms of artillery—conventional, rocket, and guided missile. Units will concentrate rapidly at the focal point of the attack, and then just as rapidly disperse following seizure of the objective. In applying the principle of mass, the primary concentration will be in the form of firepower.

In adapting battle techniques and organizations to the needs of future warfare, it must always be remembered that weapons are not enough. Man himself remains the heart and soul of military power. In the last analysis, there is no substitute for the fighting man. He is the basic and essential element of any military organization. The most modern equipment of today and of the future is meaningless unless it can be mastered by man. The Army is absolutely dependent upon the skill and courage of the American soldier.

From programming to actual delivery,

significant advances have been made in

ARMY LOGISTICS

DURING Fiscal Year 1956, the Army placed emphasis on the development of major logistical objectives which would provide proper support for the type of warfare which could be expected in the Atomic Age.

At the same time it was essential that (1) consideration be given to being totally prepared and equipped for "small wars" throughout the world, and that (2) proper supplies, facilities and equipment be available for our peacetime forces in sufficient quantities.

Operating within budgetary limitations, effective management systems were carried out to insure that the Army obtained the maximum benefit from each dollar spent. Despite this, however, consideration had to be given to the Army's ability to respond fully and be prepared logistically to support any type of operation.

Towards these ends, emphasis is being placed on:

- Logistic readiness to respond to varied concepts of defense strategy and world conditions.
- Materiel management and processes of introducing new weapons and equipment into the supply systems and phasing out of older materiel.
- Reducing the variety and quantity of items in stock.
- Reducing the long materiel requisition time from overseas commands.
- Construction, including family housing.
- Integrated programming, budgeting, accounting and reporting systems to permit greater flexibility.

Prepared by the Office,

Deputy Chief of Staff for Logistics

- Effective organization and controls.
- Improving the system of developing and assigning logistical managers.

MATERIEL PROGRAMMING

CONSIDERABLE progress has been made in materiel management and in gearing the Army's materiel programs to the "long pull" ahead. Objectives are oriented as closely as possible to current national policy and world conditions.

Throughout, the Army's logistic approach is to carry out a long-range program for major equipment which emphasizes the achievement of capability in newly developed weapons of great power. It is felt that placing the newer weapons in the hands of units will be significant as a war deterrent. However, it is also necessary to achieve a balanced stock of conventional weapons.

Retaliation must follow on the heels of defense and will require, with equal emphasis, the availability of modern weapons for offense. However, the rate of transition from the Army of just a few years ago to a future, highly mobile striking force will be governed by advances in technology and by the rate at which acquisition of modern equipment can be financed.

The transition program is expensive, and is not limited to weapons alone. There is also need to achieve a modern inventory of other very essential items such as trucks, communications and engineer equipment, and the like.

Attention is normally concentrated on the more glamorous items such as guided missiles and atomic weapons, and the Army is making the best use of available knowledge in programming for them. Similar attention is given, however, to long-range programming of more prosaic items such as commercial type vehicles. In the latter instance, cost of replacement becomes a primary limiting factor, and thus we must effect a year-to-year partial replacement of these items.

In military-type items, the Army plans on retaining minimum production lines which will not only permit replacement of worn-out or obsolescent materiel quantity-wise but will allow for the inclusion of latest improvements in annual production.

The normal tendency of management is to concentrate on large items of supply representing high unit costs. A great deal of importance, however, is attached to the thousands of secondary items and repair parts which require a greater degree of administration and operation activity. The Army is therefore continuously striving to improve management of these items.

PROCEDURES governing computation of requirements and periodic review of procurement have been subjected to critical study, and several outstanding improvements have been made. For example, the general 60-day operating level imposed on minor items of supply was found to be included as an additional safety level in requirements computations. This has been eliminated from approved requirements formulae, resulting in a significant one-time reduction in Army stocks and a one-time reduction of about 16 percent in the fund requirements for minor items.

In the interest of reducing administrative effort and costs, the Technical Services have been authorized to procure a two-year supply of items having annual issues up to $200, and a one-year supply of items with annual issues between $200 and $1000.

Procedures are being further revised to permit more general and less frequent attention to small-dollar-value, slow-moving items and items with a relatively constant rate of demand; and at the same time, to require closer and

more frequent reviews of high-dollar-value, fast-moving items and items with great fluctuations in demand. Besides savings in administrative costs these changes will also cause a proper shift in management effort and emphasis.

INVENTORY MODERNIZATION

SIGNIFICANT progress was made in reducing items of supply in the logistics system. The Army, which had about 1,500,000 different items in its system on 1 July 1952, had reduced this to about 900,000 on 30 June 1956. The reduction was achieved by exhausting usable stocks, eliminating obsolete items, consolidating item nomenclatures, and challenging user demands.

A thorough study was completed on the types and quantities of items authorized to the various units and organizations of the Army. Based on this, tentative Tables of Organization and Equipment were prepared and tested in several field exercises. Results of these tests are now being incorporated in revised tables, leading to further reductions by eliminating duplicate and excess items.

The difficult task of planning the most economical but necessary introduction of new weapons and equipment into the Army system has been eased considerably by the installation of a Modernization Coding System. Relating items currently in the system with those expected from development makes possible a time-phased plan for changeover from old to new items.

Since it was formally installed during FY 1956, the system has provided a method by which items can be identified as to current and projected status within a planning period of three to five years. It is now known, for example, that the Army's inventory is currently about 85 per cent modern; however, about 42 per cent of this inventory can be expected to become obsolescent or obsolete during the next five years. Knowing this, logistic planners can achieve greater reliability and accuracy in drawing up materiel plans and programs.

CATALOGING–STANDARDIZATION

THE Army's Cataloging and Standardization Programs, designed to systematically record and identify all items of supply and reduce the number of sizes, kinds or types of generally similar items, contributed to the net reduction of the number of supply items by over 93,000 during FY 1956. At the end of FY 1956, 95.3 per cent of the Army supply items had been identified in terms of Federal Catalog data; and the remainder was completed by 1 October.

PLANT OPERATIONS

EMPHASIS has been placed on making the Army Program System a useful tool for logistical management. It also has been integrated in timing with the budget sequence and provides the basis for budget justification.

A single uniform system for managing depot operations by integrated programming, budgeting and accounting, has been installed throughout the Army Depot System. This is an integral part of the Army Command Management System which gives the commander clear-cut authority and responsibility to carry out his mission.

A program for Engineered Performance Time Standards has also

been established to control internal management of installations. It will assist in reducing the cost of operations and in determining manpower requirements.

The Army had 18 installations operating under the Army Industrial Fund with an estimated sales volume of $464 million for Fiscal Year 1956. Under the Industrial Fund, a no-year revolving fund is authorized to provide working capital, and all expenditures from the fund are replenished by the sale of products or service at cost.

Besides making possible better control of Army facilities and stocks, these systems result in more effective management and reduced operating costs.

DISTRIBUTION IMPROVEMENTS

THE Army Field Stock Control System—set up as a pilot installation in each zone of the interior Army last fall—will be implemented worldwide during calendar year 1957. This system is designed to stock fast moving items forward and slow moving items in the rear.

In order for an item to qualify for stockage at station level under the system, there must be at least three demands for it within 180 days. As a result of tests in each zone of the interior Army Area, all posts, camps and stations in the United States are in the process of establishing a system of materiel control which is based on *actual demand* (rather than past issue experience) in the using unit. In some installations, reductions of up to 50 per cent in warehouse stocks have been efficiently achieved.

An outgrowth of the Army Field Stock Control System is a test called Project MASS, which is now being carried on between logistics installations in the United States and Seventh Army in Europe. In essence, it is a test of the feasibility of reducing the repair parts stockage of an oversea field Army by supplying it direct from Continental United States distribution depots. Thus, service is substituted for stockage, and maintenance in storage overseas becomes a thing of the past.

Increasingly, smaller, mobile depots are replacing fixed installations, and maintenance standards are improving. Electronic data machines are being introduced to increase the accuracy of Army accounts and reports, to establish better control of widely dispersed stocks and improve logistics operations. The machines have been introduced at the Ordnance Tank and Automotive Command (Detroit), Engineer Supply Control Office (St. Louis), The Army Signal Supply Agency (Philadelphia), and at the Quartermaster Inventory Control Center (Richmond, Va.), and will be phased into other central supply and stock control points at various times. Major improvements in inventory control and in service will result.

Distribution of expendable supplies on a self-service "supermarket" basis has been tested at Fort Lee, Virginia, and Fort Lewis, Washington. This system has proved to be a much more rapid, efficient and economical method of distributing expendable supplies at posts, camps and stations. The system is now being extended to other installations where warranted.

The Army Depot Plan (1954) resulted in releasing about 20 million square feet of covered storage

space held by the Army and reduced the cost of depot operations by more than $30 million annually. The Army is continuing to study various methods of obtaining improved utilization of the remaining Army Depots, reducing the vulnerability of materiel in storage, and reducing administrative costs.

All of these systems are directed toward insuring (1) that the Army has the supplies in the numbers that are required; (2) that stockage of excess supplies is eliminated, and (3) that maximum benefit and use is obtained from expenditures within existing budget limitations.

CONTROLS

THE installation of Financial Inventory Accounting, Stock Funds, Industrial Funds, Depot Command Management System and Army Field Stock Control are some of the management controls which the Army has established to improve logistical operations and effect savings in operating stocks and costs. These measures permit the Army's logistics managers to do their jobs more effectively.

PROCUREMENT

THE United States Army is one of the largest businesses in the world. To carry out its operations the Army must purchase thousands of different items.

During Fiscal Year 1956 alone, total procurement deliveries amounted to $3.7 billion. Of this amount $2.7 billion was hard goods such as weapons and vehicles.

The Army is continuing to emphasize use of call and open-end contracts, providing for direct delivery from vendors to using activities. Besides reducing the need for depot storage and transportation, such contracts also tend to reduce administrative costs. At the end of FY 1956, approximately 2600 such contracts were in effect.

Reemphasizing its policy regarding small business firms, the Army provided equitable opportunity for small business to compete for the supplies and services being procured. Small business firms received prime contracts totalling $1.7 billion, approximately 39 per cent of the total dollars obligated during FY 1956. In addition the Army for the first time has urged prime contractors to adopt a small business program comparable to that of the Army and to report to the Army that portion of the Defense contracts placed with small business on a subcontract basis.

INDUSTRIAL MOBILIZATION

WITH the development of thermonuclear capability throughout the world, the Army in FY 1956 decided to stress the capability to manufacture new types of munitions and still maintain the capability to produce conventional weapons. Because of the importance of being able to retaliate immediately in kind in case of a surprise atomic attack on this country, increasing emphasis has been placed on the maintenance of ready reserve stocks of both new and certain conventional weapons, and less on maintaining standby production facilities. This concept and reductions in military spending have led to giving priority to the storage of reserve production equipment. Government - owned central sites are now being utilized for this purpose rather than contractor property.

The Army is further advancing its mobilization readiness by modernizing its basic arsenals. This is done in order to have the knowledge and skills, technical data and manufacturing processes in a ready-for-use condition for quantity production by private industry, with the Army prepared to control the quality and performance of military materiel. Production know-how is being kept in phase with research and development to minimize the loss of time from development to mass production.

CONSTRUCTION

CONSTRUCTION activity during the year was directed primarily at providing for urgent mission-type facilities and a phased increment in the permanent plant required for the "long range" Army. Approximately $450 million in new work was placed under contract, a slight increase over the $415 million started during the preceding year.

Significant progress has been made in providing Nike facilities for the protection of major cities and other strategic targets. Construction of essential Research and Development and Operational facilities has also continued. Permanent construction has included the provision of more spaces to house the "long range" Army.

A large proportion of overseas work was devoted to the Line of Communications servicing our forces in Europe, with approximately $75 million allocated for new construction work in LOC France. Construction support (approximately $1 million) was also provided for the shifting of troops from Austria to Italy, and limited new work was started in other overseas areas to meet operational requirements.

Construction for the Army Reserve and National Guard was stepped up to meet the requirements of the new Reserve Forces program. Construction for the Army Reserve ($14 million) was approximately four times greater than the work placed during the previous fiscal year. National Guard construction was also greater with Federal participation increased from approximately $19 million to $29 million.

Much progress has been made in troop and family housing. The Army began construction on 16,791 enlisted barracks spaces at permanent installations during the year and completed 41,936 spaces that had been begun prior to FY 1956. Modernization and rehabilitation of 66,000 barracks spaces was also completed, and plans have been established for the modernization of 55,000 annually during Fiscal Years 1957 and 1958.

Progress has likewise been made in housing for Army families. Some 3,772 new family housing units were started during the year and 764 under way the previous year were completed. Under the Capehart housing program, 284 units were placed under contract and the design of 17,336 additional units was completed.

Congress gave broad attention to the critical need for military family housing by enacting an extension of the Capehart provisions for privately financed construction. Under this Act, the average unit cost ceiling was raised from $13,500 to $16,500.

Programs were initiated in

France, Italy and Japan to provide family housing, utilizing funds from overseas sales of surplus agricultural commodities.

Since the National Security Act of 1947 the Army has supervised construction work for the Air Force amounting to more than $6 billion. During FY 1956 alone, the Army managed a construction program for the Air Force amounting to $815,000,000.

MILITARY ASSISTANCE PROGRAM

THE ARMY delivered about $1.2 billion worth of military equipment and supplies to thirty-eight friendly countries during Fiscal Year 1956. These deliveries included tanks and automotive vehicles, as well as artillery, small arms, electronic and other items.

A portion of the military supplies and equipment provided under MAP is manufactured in friendly countries overseas under the Offshore Procurement Program. Significant economic benefits grow out of this program, but the primary purpose is to develop a military production capability overseas so that, in the event of emergency, there would be less dependence on supply lines from the United States. During the year more than $55 million in contracts was placed overseas and cumulative deliveries from offshore procurement totaled $400 million.

SUPPLY TRAINING

THE ARMY has approximately $20 billion worth of supplies and equipment. Management of such huge and costly stocks is a complex problem, requiring increased numbers of professionally qualified personnel. To obtain these, an overall education program was launched in 1954 with the establishment of the Army Supply Management Course at Fort Lee, Virginia, to train top level managers in the logistics field.

In April 1956 this course was expanded into the Army Logistics Management Center, providing training for both top and middle level managers in the Army Supply System. Courses in Procurement, Requirements, Storage and Distribution, Maintenance and Property Disposal, are designed to reach an estimated 15,000 individuals holding middle managerial positions in the zone of interior.

In addition, a comprehensive Civilian Career Management Program has been developed which provides for the establishment of career programs for all key civilians in occupation fields within Logistics. The Program provides for early identification of key civilian positions within each field, recruitment of well qualified individuals, and progressive development of employees to insure continued advancement of the best qualified personnel to the top positions. To date, 43 fields within the Technical Services have been identified and the Career Management Program has been applied in these areas.

A similar career program has been initiated for logistics officers.

Development of new techniques for supplying a modern Army, the establishment of civilian and military career programs and the adoption of more effective management controls are only a few of the major accomplishments of the past year designed to ensure the Army's preparedness for logistical support of any type of operation.

Far-reaching innovations

in budgetary programs

and fiscal systems

clear the way for streamlined

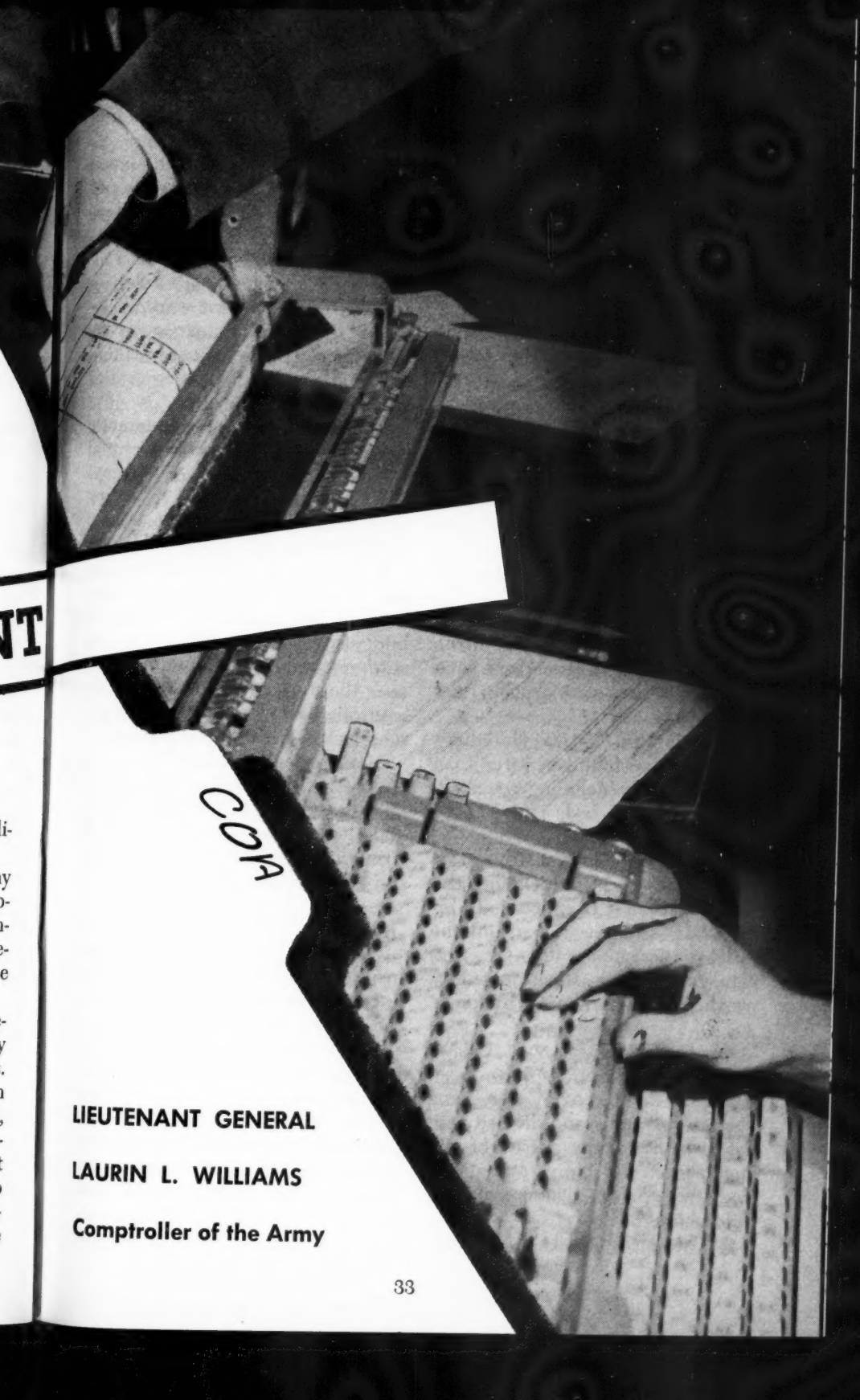
ARMY MANAGEMENT

IN THE overall sense of management, the past year is the most significant in the Army since the close of World War II.

Unprecedented advances have been recorded in establishing and improving programs and systems which make the Army's operations more productive and more streamlined and yet enable the Army to carry out its responsibilities at less proportionate cost. These improvements give an orderly standardization to many procedures while, at the same time, they vastly increase the flexibility so essential in modern military operations. Advances such as these contribute immediately to the greater combat readiness and fighting effectiveness.

The new flexibility of the Army planned in the age of atomic weapons and guided missiles is not confined to combat tactics. Management processes, too, must be equally pliable.

In any type of warfare, management is the inseparable corollary of combat strategy and tactics. Without swiftness and aptitude in the Army's management systems, "modern" warfare would lack meaning and substance. Management must properly control its money to provide the men, weapons, equipment and supplies; it also must see



LIEUTENANT GENERAL

LAURIN L. WILLIAMS

Comptroller of the Army

that these essentials, and enough of them, arrive together at the right time and place to insure maximum effectiveness.

Considering the wide range, complexity and size of the Army's responsibilities and activities, the challenge to Army management is perhaps one of the greatest in the world among both military and civilian organizations. The Army, with troops and operations in 73 foreign nations, is the most widely deployed military force in the world; and in addition to its direct war-readiness responsibility, its functions touch in varying degrees nearly every facet of human endeavor, from building flood-control dams to Pakistan labor problems to glaciology.

The Army manages more than 16,000 square miles of land in the United States and abroad—an area nearly the size of Maryland and New Jersey.

It maintains 250,000 buildings with a square footage bigger than 200 Pentagons, including space for 100,000 hospital beds and 100,000 family housing units.

It operates the largest supply system in the world, which includes handling certain requirements for the Navy and Air Force and the Military Assistance Program, and manages a bulk stock inventory worth approximately $20 billion.

IN A SENSE, many of today's management functions have been standard in the Army for some years. Magnitude and diversity are not new, nor is the pursuit of efficiency in all the Army's operations. Today there are several principal differences, however:

- The Army must be instantly ready for war at any time and anywhere in the world;
- The Army concurrently must plan, train and buy for two types of possible wars, atomic and non-atomic;
- The terms "speed," "flexibility," and "efficiency" are relative, and victory in modern warfare demands that Army management attain them in a precedent-breaking degree distinctly surpassing that of any potential enemy;
- Due to the preponderantly larger armies of America's potential enemies, Army manpower and materiel must be employed to an extraordinary degree of efficiency and effectiveness; and
- During a period of official peace, when the military services cannot be extended unlimited budgets, prices on all the Army's equipment and functions are rising, and these costs must be strictly controlled to provide the Army the most power for the least money.

Management's assignment, then, is to provide a better Army not only in the terms of World War II and the Korean War, but a better Army in terms of the war of tomorrow—and for less money.

ARMY PROGRAM SYSTEM

ONE OF THE newer management instruments used by the Army to control its far-flung operations is the Army Program System.

In simplest terms, the system is a standardized method to help the Army do its job better by providing the framework and processes for *planning* its activities from quarter to quarter and year to year, for *executing* the work planned, and for *reviewing* and *analyzing* progress to determine whether accom-

plishments match the programmed objectives. Equally important, the system helps to provide a projection of workloads and costs which are essential in the planning and preparation of the Army's budget.

The Army Program System groups related—though separately administered—aspects of a particular responsibility, such as Troops, into one program. A Director then is assigned responsibility for that program, with the recognition that his responsibilities in a particular program may cross command lines. (Other main programs include Materiel and Installations.)

While the more detailed components of many broad activities must be administered separately to insure cohesion and efficiency, the correlation of these tasks under a single policy direction permits a readily comprehensive picture of a broad program and its integrated parts. A balancing of activities against each other is an additional benefit which adds to efficiency.

The system also has a built-in check on effectiveness in the requirement that progress is measured against objectives.

The Director thus is able to determine quickly if the program is behind schedule or ahead of schedule, why, and what must be done to bring the activity into line.

During the past year the System was extended to the Medical Corps, Ordnance Corps, Corps of Engineers, Quartermaster Corps, Transportation Corps, Signal Corps and Chemical Corps. While the technical services always have had a part in the overall Army programs, they now have begun planning their own specific objectives of accomplishment for each fiscal year and each quarter and aligning their activities toward these goals.

The system—already in operation in Continental Army Commands as well as in the Department of Army—also was extended to the Army Commands overseas during the past year.

FINANCIAL MANAGEMENT

ALL THE Army's operations require financing. Every activity and every item of supply has its origin in the Army's management of funds appropriated by the Congress. Along with the Army Program System, then, the next basic control procedure is overall Army Financial Management.

There are three critically important requirements of financial management:

- The Army must be able to tell its money story to the Congress and the President clearly and concisely;
- As much benefit as possible must be derived from every dollar appropriated to the Army; and
- The financing system must support the Army's new tactical flexibility by offering in its processes the pliability and latitude that speed up and simplify the commander's financial tasks.

For many years the Army's budget was figured largely in terms of the outlay necessary for tangible items—*i.e.*, weapons, equipment, food, transportation, payroll. Money was appropriated in these terms and the Army reported back to Congress in terms of the numbers and amounts expended, on hand and needed. Except in terms of materiel consumed or expended, it did not reflect what the Army was doing. From studying the budget it was not possible to deter-

mine the actual cost of the Army's varied functions.

When it became apparent that American defense would require a bigger peacetime Army than ever before, the Congress needed to know the costs of specific Army activities—the cost of training a recruit, for example, or the costs of training throughout the entire Army. The existing financing system did not include a procedure for computing the costs of manpower used, and supplies expended, in training. The result was that if the Army wanted to train 10,000 or 100,000 men it could not effectively tell the Congress exactly how much money would be needed.

Congress then asked for a "cost of performance" or "functional" budget, one that would show the costs of Army actions and activities. From this requirement grew the Army Financial Management Plan.

The "cost of performance" was the prime need, but the plan envisioned also the goals of overall improved efficiency in operations and in accounting for those operations. This called for a decentralization of responsibility from the Pentagon to the field level so that operational performance could be better defined and measured and so that the commander could have more latitude in fulfilling his missions.

The basic elements of the Financial Management Plan tell the story:

Cost of Performance Budgeting—the preparation of budgets or financial plans in a manner that shows the cost of performance of specified functions and activities.

Appropriation and Revenue Accounting—an accounting system used to control the funds made available to various operating agencies, installations and major activities, and to account for, and report the status of, funds, commitments, obligations and expenditures. Revenue accounting is a system to assure that amounts due the government are collected and disposed of properly, and to account for and report such information in a uniform manner.

Integrated Accounting—the bringing together of the various accounting systems at a given level through the medium of a general ledger control maintained by a Finance and Accounting Office.

Financial Property Accounting—the expression of all property in dollar terms and accounting for and controlling it in these terms. It supplements property control.

Stock Funds—working capital or revolving funds which are used to buy and hold stocks of common-use items.

Industrial Funds—working capital or revolving funds used to finance the production of goods and services which subsequently are sold to its customers. The industrial fund is reimbursed through repayments from these customers.

Consumer Funding—making funds and obligational authority available through command channels to enable commanders to pay for goods and services needed in their operations and which they control.

Internal Audit—an independent appraisal of the financial and related activities of a command.

During the past 18 months the Atlantic, Pacific and Gulf Trans-

portation Terminal commands were brought into the Industrial Fund System, bringing to 20 the number of industrial and commercial-type activities operating under the system. Plans are underway to install the system in 27 others.

During this period all consumable stocks in Army depots were capitalized under the Army Stock Fund, as well as stocks of the Quartermaster, medical and dental supplies at United States stations, and other supplies at six stations of the Third Army.

Under Integrated Accounting during this period, 110 finance and accounting offices were established at Army field installations worldwide, bringing the total to 257.

COMMAND MANAGEMENT

A FURTHER development of financial management in 1955 and 1956 was the establishment of the Army Command Management System (ACMS), which not only pulls together into a smooth-running process the basic elements of the Financial Management Plan but also ties together the Financial Management Plan, the Program System and other management systems. In this way Army objectives and planning can be expressed in dollar terms in the budget and, inversely, budget changes ordered by higher authority can be effected throughout Army operations with minimum time and effort.

ACMS relates financial operations to the programs when the programs are first undertaken, and then evaluates progress in terms of cost and performance. Field commanders are given operating statements showing workload programmed and accomplished, actual costs as compared with original budget estimates, manpower used as compared with original estimates, and the effectiveness of personnel performance. Operations are reviewed and analyzed periodically so that deviations can be corrected.

Last year ACMS was fully extended in three Army Areas and action initiated in the remaining three, and in the Military District of Washington, to reach full implementation 1 October 1956. Under the direction of the Deputy Chief of Staff for Logistics, the system was activated in 49 depots in the Army supply system on 1 July 1956. The Ordnance Command Management System was put into operation in January 1956 and is being extended throughout the Ordnance Corps. Further extension in the United States and oversea commands will be accomplished in the coming fiscal year.

BUDGET AND FUNDS

THE ARMY'S budget already has begun to reflect the tactical changes gradually taking place.

Reductions in obligations and expenditures in Fiscal Year 1956 indicate some curtailments in the purchase of conventional warfare equipment, while the development of new weapons and equipment is shown in increased obligations for research and development.

Obligations for FY 1956 were $9.7 billion as compared to approximately $10.7 billion in FY 1955. Expenditures, which necessarily reflect declining trends much more slowly, were reduced from $8.9 billion in FY 1955 to $8.7 billion in FY 1956.

Funds appropriated to the Army

for FY 1957 total $7.5 billion, an increase of $200 million over last year. The additional money will go toward the continued build-up of the Reserve Forces and research and development. As in FY 1955 and FY 1956, no new funds were appropriated for Procurement and Production since these requirements are being financed from money appropriated in previous years.

MAINTENANCE & OPERATIONS

A MAJOR improvement in budget administration is the new design for the Maintenance and Operations (M&O) appropriation structure. During the past year Congress approved a plan providing eventually for eight budget programs which are the Congress-approved subdivisions of the overall Maintenance appropriation, as compared to the existing 16 programs. Because of the magnitude and complexity of the change, however, the number of programs was reduced to 12 for Fiscal Year 1957, with the reduction to eight planned for Fiscal Year 1958.

The change achieves much greater flexibility and simplification of the M&O appropriation.

MANAGERIAL IMPROVEMENT

WITH THE goal of producing better work wherever possible with the expenditure of less personnel and money, the Army constantly carries on management improvement studies and makes changes in established systems as needed.

Army Staff Changes. In recognition of the vast importance of speeding up and better coordinating the Army's scientific studies on weapons and equipment, an Office of Director of Research and Development was established on the Assistant Secretary level, and the Office of the Chief of Research and Development was moved up to the Deputy Chief of Staff level. During the year also the vacant post of Chief Scientist was filled with a highly qualified civilian.

The Office of the Chief of Staff underwent a number of changes designed to relieve the Chief of Staff of direct responsibility for many routine details of Army operations and yet also increase his efficiency in managing Army activities. Previously, 20 of the 28 principal Army Staff offices reported directly to the Chief of Staff. Through consolidations and realignments of responsibilities, the total was reduced to 26, of which 15 were arrayed under five Deputy Chiefs of Staff, leaving only 11, including the Deputy Chiefs, reporting directly to the Chief of Staff.

Data Processing Systems. In addition to feasibility studies begun during the past year on automatic data processing, systems were established or planned at numerous points throughout the Army with the purpose of increasing the efficiency of Army operations at less cost.

Computers and/or systems to be used for stock accounting, cataloging and financial management purposes were scheduled for installation at Hawaii Army Base Command; the Quartermaster Inventory Control Center at Richmond, Virginia; Philadelphia Quartermaster Depot; Engineer Supply Control Office at St. Louis; Army Signal Supply Agency at Philadelphia; Ordnance Tank Automotive Command in Detroit; Engineer Mainte-

nance Command at Columbus, Ohio; and The Adjutant General's Office in Washington.

Tests are underway at Fort Bragg and at Fort Gordon to explore the potential for mechanization and consolidation of financial accounting functions at typical Class I installations. Already the tests have demonstrated that mechanization will provide more timely and accurate reports, analyses and other financial information.

A study at Fort Meade and Fort Jackson has indicated that even greater benefits may be achieved through use of automatic data processing systems at Class I installations, particularly in the large volume areas of data processing such as supply and financial accounting and personnel strength reporting. Plans call for an engineering study to apply ADPS in these areas on a "service center" basis at Class I installations.

Reduction in Payroll Costs. A substantial reduction in the cost of paying civilian employees in the Army Establishment has been achieved through the adoption of new techniques. When this project was officially established in July 1953, one payroll office employee was required to maintain 219 payroll accounts. As of 30 June 1956, one employee was maintaining 350 payroll accounts—a 63 percent increase in efficiency. Army-wide, this meant that 608 fewer employees were required to provide these services, representing a saving in administrative costs of more than $2.4 million. Payroll offices in the United States have been reduced from 276 to 175.

Work Simplification. Approximately 20,000 supervisors were trained during Fiscal Year 1956 in the use of management engineering techniques, such as Work Distribution Charts, Flow Process Charting, Lay-Out Studies and Motion Economy. More than 10,000 improvements were installed.

Management Training. General management and financial management are taught by the Army through a variety of methods and courses, from four hours given officers in the Infantry School to 14 months in the Comptroller Course at Syracuse University, which awards its graduates the Master's Degree in Business Administration.

During Fiscal Year 1956 upwards of 10,000 officers and civilians graduated from one or another of these courses. Some 1,621 officers and civilians graduated from the seven management courses which are directly monitored by the Army Comptroller (except the Command Management Course at Fort Belvoir, Virginia).

In addition, 20 Army service schools and colleges teach management training in the advanced and company battery courses. Extensive training is conducted by the Finance, Chemical, Quartermaster and Ordnance schools in general and also financial management as it relates to their fields.

THE Army's emphasis on management is essential in meeting the demands of America's defense. In a new era of warfare, almost constant change is necessary for the Army to maintain maximum, up-to-the-minute effectiveness at the least cost. Good management of the Army's men, money and materiel is the prerequisite to give this change speed, direction and meaning.

The pattern of the future is foreshadowed

by Army progress in

RESEARCH AND DEVELOPMENT

Prepared by the Office,

Chief of Research and Development

VAST AND RADICAL changes are emerging in the development of implements of war. Science and technology have quickened the development and obsolescence of military weapons. Weapons, in turn, have changed tactical and strategic concepts. Keeping pace, the U.S. Army is in the midst of a transitional phase.

The impact of these changes upon the pattern of land combat in the future is becoming increasingly clear. Already the point has been reached where we can no longer expect merely to adapt new weapons systems and new forms of mobility to World War II type organizations. In preparing for the possibility of atomic war, entirely

CRD

new concepts of organization must be considered.

Today, more than at any other time in our Nation's history, the future of the Army depends upon research and development. A boldly conceived, imaginative Army Research and Development Program must be executed with vigor and determination to insure that American arms are second to none. At the same time, the program must be kept in gear with planned tactics and strategy and logistic support capabilities.

Planning for new equipment must be based on the assumption that in future wars atomic weapons will be used by both ourselves and the enemy. The possibility of a megaton stalemate necessitates the development of weapons systems capable of delivering small atomic as well as conventional warheads. Not only must dual firepower capability be developed, but an effective defense must be provided against similar enemy capabilities.

BECAUSE the Army must be capable of winning an all-out general war as well as putting out local "brush fires," it needs equipment that can be easily air transported on the one hand, and equipment capable of sustained combat on the other. These requirements increase the number and type of development projects and the number of different items of equipment in our troop units and supply system.

Currently, the Army is going through an unprecedented revolution in the functional fields of firepower, mobility and communications. Achieving and maintaining superiority in these fields is a fundamental objective of the Army's research and development effort. Significant contributions were made in these areas in Fiscal Year 1956.

ADVANCES IN WEAPONRY

BECAUSE of the conditions under which a war of the future will be fought, our Army must have the best weapons that science and industry can provide—both atomic and conventional weapons precisely adapted to its needs. Artillery must have far greater range and effectiveness than in the past. Major emphasis is therefore being placed upon development of complete families of guided missiles, ballistic missiles, and rockets to supplement conventional weapons.

In the field of surface-to-surface missiles, the Army's developments from the beginning have emphasized ballistic-type missiles, rather than vulnerable cruise-type air supported missiles. These include short-range assault missiles of great accuracy, anti-tank missiles, and missiles to extend the artillery's firepower in all types of weather, day or night. All are required for the highly mobile, fast-moving, deeply penetrating, widely separated combat actions of the future.

THE Corporal and Honest John ballistic missiles are but the first generation of an entirely new family of fire support weapons. Even more striking accomplishments have been achieved in the development of other new missile weapons systems, including the Dart, Little John, Lacrosse, and Redstone missiles. (See special issue on "The Army's Missiles," December 1956 DIGEST.)

The Redstone development, which has produced the largest bal-

listic missile yet fired, has met with outstanding success. Its achievement in flight tests is unequaled in missile development history. Redstone will provide an extremely reliable delivery system, having an all-weather, around-the-clock fire support capability completely responsive to the ground commander's requirements.

Experience gained with Redstone has been applied directly to Jupiter, the Intermediate Range Ballistic Missile (IRBM).

The Army is proud of its surface-to-surface guided missile development, and is exerting maximum effort to bring into operation all of the several types of missiles it requires. Near miracles have been performed. However, what the Army has already achieved is merely a milestone in its continuing efforts to provide the best that modern technology can produce.

IN THE REALM of surface-to-air missiles, the Army is developing the capability to protect overseas U. S. Forces and the Continental United States against any present or future airborne attack. Also underway are projects which will permit the delivery of lethal warheads on surface as well as airborne targets. Developments have been initiated which will provide an effective defense against ballistic missiles, to include the Intercontinental Ballistic Missile.

In anticipating the present air threat some eleven years ago, the Army developed the remarkable Nike-Ajax (Nike I) system which has been protecting our vital population and industrial centers since 1953. However, even before Nike-Ajax was operational, the Army started work on a more effective missile to counter future air threats. This second member of the Nike family, known as Nike-Hercules (Nike B), is now undergoing extensive tests. Drawing on experience acquired with Nike-Ajax, it provides greater range, higher altitude and more positive kill potential. Nike-Hercules will initially augment and ultimately replace Nike-Ajax.

DURING the year the Army unveiled the Missile Master fire direction system—the first U. S. electronic system specifically designed for coordinating the fire of a large number of Nike missile units and other advanced antiaircraft weapons. By tying together all elements of the defense system for target detection to target destruction, Missile Master enables a Nike unit commander to select the target which presents the greatest threat to the defended area. (See December 1956 DIGEST.)

TO further increase firepower, the Army is striving to increase its arsenal of low yield atomic weapons. It may well be that small tactical atomic weapons will be the only type employed in the next war. Currently, the Army's atomic firepower capability includes the Corporal guided missile, the Honest John rocket and the 280-mm. gun. Security restrictions prohibit any further disclosure of the Army's capability in this area.

It would be a grievous error to consider that because the Army now has guided missiles and atomic weapons, it can discard all of its conventional weapons. Actually, there is vital need for the develop-

ment of lighter and more effective conventional weapons of every kind, which are urgently required to accomplish many tasks for which atomic weapons are not suitable. The Army must always have available the means to apply the exact degree of force required for the job at hand.

DURING the year the Army neared completion on projects to give the infantry soldier lighter, more flexible weapons with an increase in killing power. Developments included a lightweight small arms weapons system designed to fire the 7.62-mm. NATO round, and recoilless rifles with improved armor penetrating capability. In the field of armored vehicles and tanks, the Army developed the 90-mm. self-propelled gun, which provides air-transported units with a mobile weapon capable of performing both anti-tank and assault gun roles. The gun can be air-dropped; it has the firepower and mobility characteristics of a tank, and, for its weight, is the most powerful self-propelled anti-tank weapon known.

VEHICLES AND AIRCRAFT

TO SURVIVE on tomorrow's battlefield, the Army must have the tactical mobility to cope with conditions of atomic warfare. Widely dispersed troops must be able to concentrate rapidly, strike hard, and then disperse quickly. To exploit without delay the effects created by weapons of greatly increased firepower, the Army must have complete fluidity of action.

IN order to obtain superior mobility on the ground, the Army is working to reduce weight and increase the range of combat support weapons and vehicles, including tanks, self-propelled artillery, armored personnel carriers, wheeled vehicles and infantry weapons. Research is being conducted in the use of lightweight metals, and in the development of lightweight improved armor. Lighter weight, more versatile transmissions and suspension systems, and engines with increased performance and greatly reduced fuel consumption are being developed. Research and development is underway to improve capabilities for movement over snow and ice. The long-range goal is a completely air-transportable field Army whose combat units are as independent of terrain limitations and logistical support requirements as possible.

A SIGNIFICANT step forward in land mobility was the introduction of the Mechanical Mule–a low-silhouette, four-wheel vehicle weighing approximately 820 pounds, yet capable of moving 1,000-pound loads across rough country. Work continued on multipurpose armored carriers, which are lightweight vehicles affording protection from small arms fire, thermal radiation and blast effects of atomic weapons.

For moving armor rapidly across water barriers on a broad front, design work was started on a mobile self-propelled ferry. This ferry will have road and cross-country mobility approaching that of the tank, and will be capable of rapid employment upon arrival at the water's edge.

TO facilitate the movement of large quantities of military cargo over Arctic terrain, the Army has

built a radically new vehicle, the Sno-Train, with a vastly increased cargo capacity and a speed of about 15 miles per hour. Extensive testing of this vehicle is being accomplished on the Greenland icecap where the Army is also carrying out experiments in sub-surface roads. These roads below the surface of the icecap permit movement despite bad weather and reduce the need for navigational aids.

Increased emphasis was placed on developing a petroleum distribution system responsive to the needs of highly mobile forces. Such a system will be built around a family of flexible, collapsible storage tanks and pipelines; lightweight, high-volume pumps; and tanker discharge facilities that lend themselves to air-transportability, quick installation and rapid movement over considerable distances.

TO attain flexibility of operations and freedom from dependence on established port facilities, continued emphasis has been placed on the development of logistical over-the-shore equipment. Tests were continued on the BARC, the Army's giant amphibious cargo carrier. Construction on a prototype beach lighter was started. This vessel will expedite unloading from roll-on, roll-off ships and facilitate over-the-beach operations.

AN INDISPENSABLE part of battle area mobility is Army aviation. With ever increasing rapidity and efficiency, aviation technology is being integrated into the military services in many forms, not only as a vital means of organic transportation of military forces and their supplies but also as a specialized weapons system.

The Army is rapidly integrating air vehicles of the slower-speed, short-range types to increase its mobility. Besides giving ground combat forces a new dimension of mobility in the battle area proportionate to the great increase in firepower of their nuclear weapons, Army aircraft permits this firepower to be applied with flexibility and discrimination at decisive points.

THE Army is utilizing all available resources to develop simplified, reliable vertical and short takeoff and landing (VTOL-STOL) air vehicles that can operate from rough, unprepared terrain. In the field of observation aircraft, a new higher-performance airplane is being developed to improve battle area surveillance. Work has started on a new light observation helicopter for use with the Army's new ground reconnaissance units. In the cargo field, improved 1½-ton and 3-ton payload helicopters and VTOL-STOL airplanes are being developed.

To provide short-range mobility for missiles, armored vehicles and other heavy items of equipment, design studies of a flying crane helicopter were initiated. Based on the results of these studies, development will begin in 1957. In addition, the Army is testing two individual lift devices that offer promise of providing air mobility for the individual soldier.

Another important area of aircraft research and development is the development of a family of small turbine engines for use in the Army's new family of aircraft. During the year the Army initiated the

development of a 250-HP gas turbine engine to complement the present 800-HP and 1500-HP engines. Work on the XH-40 utility helicopter—the first American helicopter specifically designed to use a gas turbine engine—has been accelerated in order to provide the aircraft in operational quantities by 1959.

Initial tests were successfully completed on a new air-drop system. It utilizes a small ribbon-type parachute which delivers cargo at three times the present descent rate, with expendable honeycomb material to absorb the increased landing shock. This permits substantially more accurate delivery at one-fifth to one-tenth of the cost of current equipment. (See "Deliver It By Air," November 1956 DIGEST.)

The compelling urgency of developing mobility in the battle area is a primary consideration in Army research and development. Major effort is being concentrated on improving the soldier's ability to move on tracks, wheels, or by air.

COMMUNICATIONS EQUIPMENT

IN THE future Army, reliable communications must provide the commander the means to control subordinate units more effectively under extremely mobile and dispersed conditions. Communications systems, both strategic and tactical, must be able to operate despite enemy jamming and be relatively easy to maintain.

To provide contact between battle groups, the Army has devised a grid concept which will enable mobile forces to maintain communications simply by "plugging-in" to the closest communication center. Another major advance was the development of a new series of lightweight, transistorized and more flexible radio equipment. Transistors made possible an individual radio set for the individual soldier, small enough to be carried in the helmet. This set promises improved small-unit effectiveness and control despite increased dispersion of personnel in the battle area.

Also during the year the Army adapted new portable television systems to a variety of uses. Either carried by hand or in drone aircraft, the pick-up units will send back information on battle progress, thus permitting commanders to make quicker and more accurate combat decisions. They will also be valuable for gathering intelligence data.

To improve means of gathering and reporting information accurately and promptly, a major program is underway to develop a battle area surveillance system for detecting and locating targets and gathering information about the enemy. This system, using both ground-based and airborne equipment, shows promise of informing the commander of vital events almost as soon as they occur.

OTHER RESEARCH

IN ADDITION, the Army is conducting aggressive programs in basic research of long-range significance to national defense.

One such goal is the development of new chemical fuels having superior properties and high energy content. Fuels of this type are needed for propulsion of missiles, rockets, projectiles, and surface and air transportation. Attainment of this goal is possible through the

use of new chemical additives to conventional fuels and through the utilization of wholly new fuels. One phase of research is concerned with the highly reactive chemical species known as free radicals. Certain molecules, such as hydrogen, can be split into free radicals and stabilized at extremely low temperatures. When these radicals re-combine into molecular form, great energy is released. Because of their potential importance, these phenomena are under intensive study by Army scientists.

Army scientists and engineers are making a continuing contribution to the Navy's Vanguard program for launching an earth satellite during the International Geophysical Year (IGY). Many of the problems concerned with propulsion, ballistics, launching and observation have been solved with the help and advice of Army technical personnel. The Signal Corps will set up and operate a chain of observation stations from Georgia through South America. The Army has established and is now operating a rocket facility at Fort Churchill, Canada.

In the nuclear power field, the Army is constructing the first United States nuclear power plant designed solely for electric power production. Construction was begun at Fort Belvoir, Virginia, in October 1955. This plant will be the prototype of a design the Army is seeking to meet the fast-moving needs of modern war. Initially the nuclear power plant program was directed toward fixed plants which could be packaged for air transport, but were intended to operate as fixed installations. Subsequent studies have been directed toward development of a smaller fixed nuclear power plant for use at small and very remote military installations where logistical support is primarily by airlift. These power reactors show promise of significant savings in fuel required to produce electrical energy.

During the past three years the Army has been actively engaged in research and development on radiation preservation of foods. Potential advantages of this process include a reduction in refrigeration requirements, reduced food losses, improved control of certain foodborne diseases, and wider availability of fresh foods. Research thus far has shown that radiation preservation does not detract from the wholesomeness or nutritional value of food items and does not render food radioactive. (See "Preserving Food by Radiation," October 1956 DIGEST.)

Plans are underway for a U. S. Army Ionizing Radiation Center incorporating the world's first pilot plant for food irradiation, to be established at Sharpe General Depot, Stockton, California. The facility, with a peak capacity of 1000 tons of food per month, is scheduled for completion by October 1958.

PARALLELLING these gigantic strides in the development of weapons, vehicles, aircraft and communications equipment, the Army is making significant progress in providing equipment for the indispensable element in war—the individual soldier. Under development are improved medical techniques, protective creams and ointments, protective clothing of various types, individual foxhole

diggers, lighter weight gas masks, and many other items, all designed to increase the soldier's chances for survival on the atomic battlefield. Important advances have been made in new methods for treatment of radiation and thermal burns and shock, and in development of new vaccines for communicable diseases of military significance.

These highlights represent a few of the most significant areas in Army research and development in the past year. The Army is modernizing every part of its equipment and weaponry and, with it, its concepts of tactics, strategy and logistics. Under the impetus of its forward-thinking, forward-looking Research and Development Program, the Army will continue to develop weapons systems of great power and versatility, capable of overwhelming any aggressor that may challenge our Nation in the future.

MULTIPLE MOBILITY over snow, water and through the air is provided by the recent products of Army Research and Development depicted opposite. The Sno-Train (above) can traverse the vast reaches of the Arctic; the amphibious M-59 armored utility vehicle carries a Dart anti-tank missile; while the Flying Platform (below) achieves a long-sought goal—aerial mobility for the individual infantryman.

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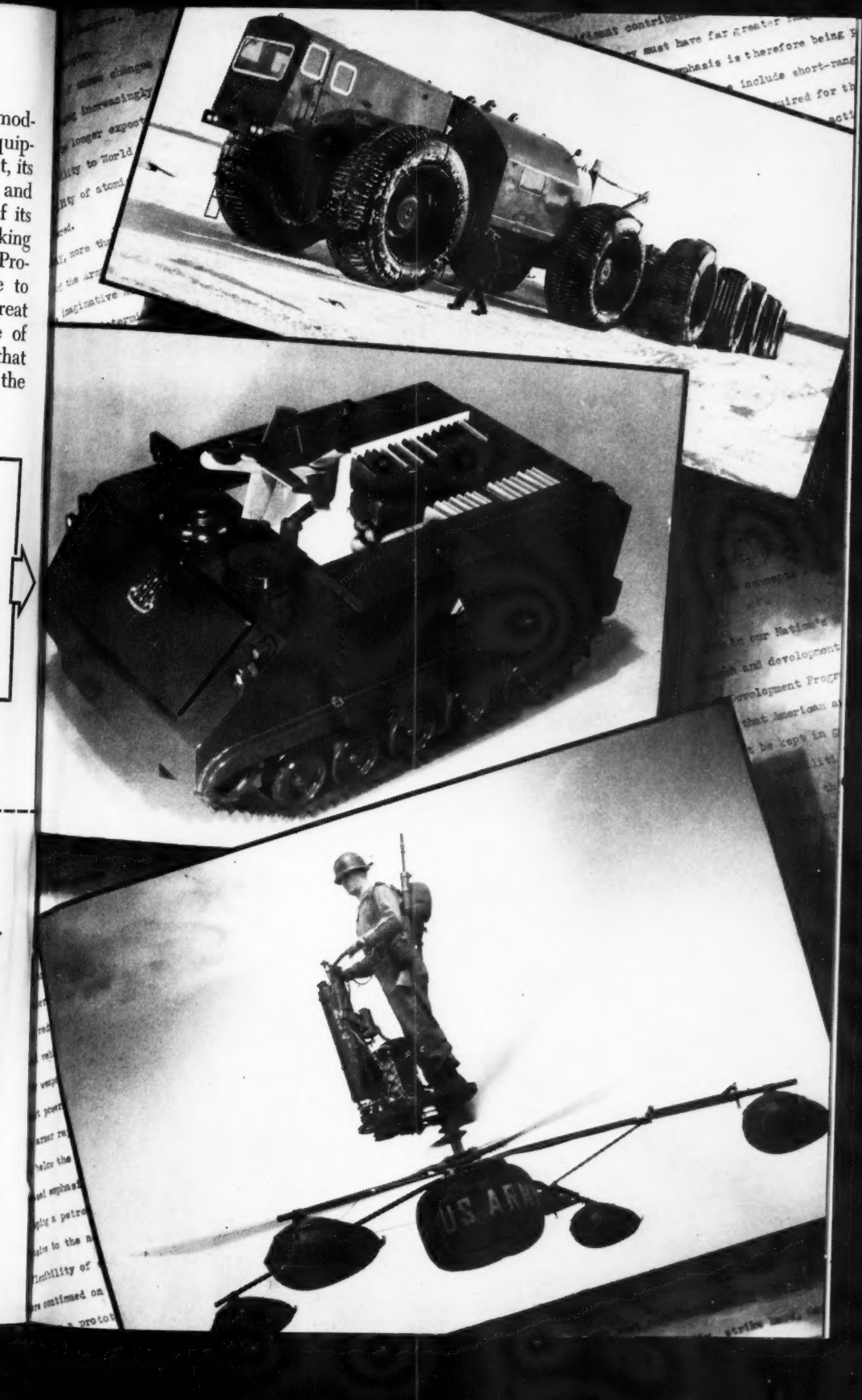

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